REMARKS

As a preliminary matter, Applicants have included a copy of a Claim for Priority, a copy of the first page of the priority document, and a copy of the postcard acknowledging receipt by the U.S. PTO of the priority document. Accordingly, Applicants respectfully request acknowledgement that a certified copy of the priority document was filed as required by 35 U.S.C. 119(b).

Claims 1-9 stand rejected under 35 U.S.C. 103(a) as being obvious over Kawato et al. (JP 11-175925), in view of Fontana, Jr. et al. (U.S. Patent No. 5,729,410). Applicants respectfully traverse the rejection because the cited references do not disclose or suggest a current-perpendicular-to-the-plane (CPP) structure magnetoresistive element that includes, among other things, a magnetoresistive film having a lower portion and an upper portion such that the upper portion extends over a surface of the lower portion by a width that is smaller than a width of the lower portion in a lateral direction.

Kawato et al. disclose a free layer ferromagnetic body film 30 on a set of layers 22-26, as shown in Fig. 3. A width in the lateral direction of the free layer ferromagnetic body film 30 is smaller than that of the set of layers 22-26. However, the upper part of the free layer ferromagnetic body film 30 is sandwiched between permanent magnetic films 28. The permanent magnetic films 28 are made of CoCrPt, and are believed by Applicants to exhibit conductivity. As a result, the actual width of the upper part of the free ferromagnetic layer includes not only the film 30, but the conductive films 28, as well. The width of the

layer (28+30+28) is equal to the width of the lower portion (layers 22-26). Therefore, a narrower path in the upper part of the free layer ferromagnetic body film 30 is not disclosed or suggested. That is, Kawato et al. fail to disclose or suggest a narrower path for electric current between the lower portion of the magnetoresistive film and the upper electrode layer in a CPP structure MR element.

Fontana, Jr. et al. disclose hard biasing layers 150 which sandwich a part of the sensing ferromagnetic layer 132 and a part of an insulating layer 160, as shown in FIG. 4A. However, Fontana, Jr. et al. fail to disclose or even suggest a narrower path for electric current between the lower portion of the magnetoresistive film and the upper electrode layer in a CPP structure MR element.

Claim 1 is directed to a CPP structure magnetoresistive (MR) element. Claim 1, as amended, defines the upper and lower portions of the magnetoresistive film such that the lower portion extends over the surface of the lower electrode layer by a first width in the lateral direction, and the upper portion extends over the surface of the lower portion by a second width in the lateral direction. The second width is smaller than the first width. In addition, claim 1 defines the insulators and the domain control magnetic layers such that the insulators are located adjacent to the upper portion on the surface of the lower portion in the lateral direction, and the domain control magnetic layers sandwich the upper portion in the lateral direction and are spaced from the upper portion by the insulators.

FIG. 4 of the present application shows insulators 58 that serve to establish a narrower path for electric current between a lower portion 39a of the magnetoresistive film and the upper electrode layer 36 in a CPP structure MR element. Thus, a substantial width in the lateral direction of a recording track can be reduced in the magnetoresistive film. The CPP structure MR element contributes to an improved recordation density for a magnetic recording medium. In addition, not only the lower portion 39a, but also the upper portion 39b of the magnetoresistive film can be disposed in a space between the domain control magnetic layers 41. Consequently, a longitudinal biasing magnetic field, which is established between the domain control magnetic layers 41, efficiently acts on the magnetoresistive film. In particular, if a free magnetic layer is included in the upper portion 39b of the magnetoresistive film, the free magnetic layer can be subjected to a larger longitudinal biasing magnetic field in the CPP structure MR element. Accordingly, a single domain property can be realized in the free ferromagnetic layer, and the Barkhausen noise can be reduced. For these reasons, withdrawal of the §103 rejection of amended claim 1 is respectfully requested.

Claim 2 indicates that the insulators are magnetic. As amended, Applicants traverse the rejection of claim 2. The Examiner states in the Office Action (Paper No. 4) on page 23, line 13 that Kawato et al. is silent as to the insulator being magnetic. The Examiner further fails to indicate a rationale for the rejection. Since the insulating layer 160 of Fontana, Jr. et al. is made of alumina (Al_2O_3) or silica (SiO_2) (Col. 5, lns. 39-40), the

insulating film of Fontana is not magnetic. Since the cited references fail to disclose or suggest that the insulator is magnetic, as now recited in amended claim 2, withdrawal of the §103 rejection of claim 2 is respectfully requested. Claim 3 is considered allowable for the reasons recited above and based on its dependency from claim 1.

With respect to claim 4, Applicants respectfully traverse the rejection because the cited references fail to disclose or suggest, among other things, a method of making a current-perpendicular-to-the-plane structure magnetoresistive element which includes a step of forming an insulating film that covers the main control magnetic layers.

The present invention, as recited in claim 4, calls for forming an insulator film covering over the domain control magnetic layers. This formation process occurs prior to the etching process of an upper surface of the magnetoresistive film. Thus, the insulator film serves as protection layer for the domain control magnetic layers during the etching process. The domain control magnetic layers are thus reliably prevented from being removed during the etching process. Accordingly, the domain control magnetic layers reliably sandwich the upper portion of the magnetoresistive film. Since the prior art of record fails to disclose or suggest a method having this step, withdrawal of the §103 rejection to independent claim 4, and its associated dependent claims 5-9 is respectfully requested.

New claim 10 is added and defines the insulators as made of an alloy of Co-γFe_2O_3. Claim 10 is considered allowable for the reasons recited above with respect to the

rejection of independent claim 1, and also because of its additional features. Accordingly, Applicants earnestly solicit allowance of this claim.

For all of the foregoing reasons, Applicants submit that this Application is in condition for allowance, which is respectfully requested. The Examiner is invited to contact the undersigned attorney if an interview would expedite prosecution.

Respectfully submitted,

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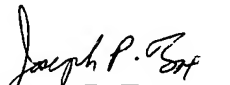
By 
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